The importance of tactical skills in talent development

Kannekens, Rianne

Chapter 2

Self-assessed tactical skills of elite youth soccer players with different academic achievement

Kannekens, R., Elferink-Gemser, M.T., Visscher, C.

Submitted to European Journal of Sport Science

Acknowledgements

The authors would like to thank all players and staff of the Dutch youth soccer teams for their participation in this study. In addition, we are grateful to the students of the Center for Human Movement Sciences for their help in collecting the data.

Abstract

This study investigates the tactical skills of 93 elite youth soccer players (mean age 17.3±0.6) attending either pre-vocational or pre-university schools. All athletes completed the declarative and procedural knowledge scales of the Tactical Skills Inventory for Sport (TACSIS). Multivariate analyses of covariance including educational level with field position and repeating class in school as covariates, revealed differences between elite youth soccer players attending pre-vocational and pre-university educational level on the total construct of tactical skills ($P<.05$). Players attending pre-university schools may benefit from the cognitive skills they acquire in their academic environment. In contrast, it seems that players attending pre-vocational schools have an advantage on the scale *Acting in changing situations*. It is recommended to investigate which players will become professional versus who will stay at the amateur level and whether this is related to their tactical skills and academic achievements.

Keywords: talent development, performance level, expert athletes, youth, education

2.1 Introduction

Academic achievement is a good predictor of sport knowledge and physical education knowledge (Dexter, 1999). Studies which focused on associations between sport performance and academic achievement suggest that young, elite athletes tend not only to perform well in sports but also in an academic setting (Brettschneider, 1999; Durand-Bush & Salmela, 2002; Jonker, Elferink-Gemser & Visscher, 2009; Umbach, Palmer, Kuh & Hannah, 2006; Watt & Moore, 2001). They have higher academic standards and graduation rates in comparison to their peers performing at lower competitive levels (Watt & Moore, 2001). These studies suggest that academic achievement is related to sport knowledge.

In the Netherlands a child's educational level and hence type of school is determined based on their academic achievement. Dutch teenagers either attend the pre-vocational or the pre-university level, with pre-vocational schools offering a mix of theoretically and practically oriented training (c.f. International Standard Classification of Education (ISCED) levels 4 and 5). Given the schools' more practical orientation, students are specifically enabled to acquire the skills they need for their future work careers. Before the students start with their work careers, they will attend a follow-up study (vocational level) in the same direction as their pre-vocational study. At the pre-university level students are prepared for a university study (ISCED level 6; UNESCO, 1997), acquiring general knowledge for use in their future studies (Ministerie van OCW, 2008). If a student has a low Grade Point Average in either school type, he or she has to repeat class. Hence, repeating class is also an indication of academic achievement.

In order to be successful in invasion games such as soccer, elite players need well-developed tactical skills besides well-developed physiological and technical skills (Elferink-Gemser, Visscher, Lemmink & Mulder, 2007; Helsen & Starkes, 1999; McPherson & Kernodle, 2003; Nougier & Rossi, 1999; Starkes, 1987). Hence, tactical skills are fundamental for high-level soccer performance (Kannekens, Elferink-Gemser & Visscher, 2009b). Academic achievement and tactical skills both rely on cognitive competencies. The cognitive competencies of tactical skills are typically categorized as declarative and procedural knowledge (McPherson, 1994). Declarative knowledge is taken to denote knowledge of the rules and goals of the game (French & Thomas, 1987; McPherson, 1994; Williams & Davids, 1995), in other words 'knowing what to do,' whereas procedural knowledge describes the selection of an appropriate action within the context of the game, i.e., 'doing it' (McPherson, 1994).

Studies on tactical skill show that athletes performing at higher performance levels are superior to players showing lower performance levels on many tactical aspects (e.g., Grehaigne, Godbout & Bouthier, 2001; Kannekens et al., 2009b; Starkes, 1987; Williams, Davids, Burwitz & Williams, 1993). More specifically, expert or elite athletes are more accurate at picking up task-relevant information and better able to integrate this information

with earlier experiences, which enables them to choose the best option available (e.g., French & Thomas, 1987; Kannekens et al., 2009b; Williams et al., 1993). They, moreover, have a more complex hierarchically organized knowledge base stored in their memory and are able to cluster items into larger and more meaningful units (Williams et al., 1993). In addition to performance related differences in tactical skills, players of different field positions (e.g., defenders, midfielders, and attackers) distinguish themselves on the basis of their tactical skills with defenders scoring best on scales for defensive situations and attackers scoring best on scales for offensive situations (Kannekens, Elferink-Gemser, Post & Visscher, 2009a).

In sum, although in elite youth athletes a positive relationship has been established between sport performance and tactical skills and between sport performance and academic achievement, it has not yet been investigated whether elite youth soccer players attending different educational levels score differently on tactical skills. To advance our knowledge about what makes a top athlete and to cultivate talent, the present study investigates declarative and procedural tactical knowledge of elite youth soccer players attending different levels of education.

2.2 Methods

Participants and procedure

We invited 93 soccer players in the 17-18 year age bracket (mean age = 17.3, SD = 0.6) to take part in a cross-sectional study. All played with national (Dutch) premier league clubs and participated in their club's talent development programme. They competed at the highest level and belonged to the top 0.5% of all soccer players in their age group (Royal Netherlands Football Association; KNVB, 2008).

Permission for the study was obtained from both the clubs and the trainers and the athletes were individually informed about the study and its procedures, following which they provided their informed consent. All procedures were in accordance with the standards of the ethics committee of the University Medical Center Groningen and the University of Groningen.

The data were collected at the end of the competitive season and considered based on the type of education the athletes attended, with players receiving pre-vocational and vocational level (n = 45; further mentioned as pre-vocational level) and players studying at the pre-university level (n = 48). Table 2.1 presents general characteristics concerning age, sport practice, field position and repeating class in school per type of education.

Table 2.1. General characteristics (means; standard deviations) of the elite youth soccer players specified per type of education

	Educational level	
	Pre-vocational *n*=45	Pre-university *n*=48
Age (years)	17.25 (0.61)	17.38 (0.56)
Accumulated organized soccer experience (years)	10.36 (2.11)	11.41 (1.67)
Soccer practice (hours/week)	8.38 (1.48)	8.84 (2.38)
Non-specific soccer practice (hours/week)	2.08 (2.38)	2.45 (2.44)
Soccer matches (per week)	1.06 (0.19)	1.04 (0.18)
Field position (n)		
Defender	22	15
Midfielder	12	21
Attacker	11	12
Repeating class in school (n)	14	10

Tactical skills knowledge

The 22-item Tactical Skills Inventory for Sports (TACSIS; Elferink-Gemser, Visscher, Richart & Lemmink, 2004) with separate scales for declarative and procedural knowledge was used to assess the extent and nature of the athletes' tactical skills. This questionnaire is developed especially for players of invasion games such as soccer (Elferink-Gemser et al., 2004). The scales *Knowing about ball actions* (e.g., "I know exactly when to pass the ball to a teammate or when not to") and *Knowing about others* (e.g., "I know quickly how the opponent is playing") contain four and five items respectively that were related to declarative knowledge. The scales *Positioning and deciding* (e.g., "My getting open and choosing positions is") and *Acting in changing situations* (e.g., "My interception of the opponents is") consisted of nine and four items respectively that gauged procedural knowledge. When rating their sport performance, the respondents were instructed to compare themselves with top players in the same age category, scoring the items on a 6-point Likert scale ranging from 'Very poor' to 'Excellent' or from 'Almost never' to 'Always'.

In previous research, the TACSIS was shown to have good psychometric characteristics with internal consistency coefficients (Cronbach's alphas) of all four subscales ranging from 0.72 to 0.89 (Elferink-Gemser et al., 2004). The Intraclass Correlation Coefficients (ICC) for repeated measures was 0.76 for *Knowing about others* and 0.88 and 0.82 for *Positioning and deciding*, and *Acting in changing situations*, respectively. The scale *Knowing about ball actions* had an ICC of 0.60 (Elferink-Gemser et al., 2004). For detailed information about the development of the TACSIS, see Elferink-Gemser et al. (2004). In the current study, the

internal consistency of the four TACSIS scales indicates good internal consistency (Nunally, 1978) with Cronbach's alpha of 0.84 for *Knowing about ball actions*, 0.79 for *Knowing about others*, 0.90 for *Positioning and deciding*, and 0.79 for *Acting in changing situations*.

Data analyses

For each subgroup the players' mean scores and standard deviations were calculated for the four subscales of the TACSIS and multivariate analysis of covariance (MANCOVA) was conducted (factor of educational level) to examine group (educational level) differences. Field position and repeating class in school were included as covariates. Standardized mean scores or effect sizes (*d*) were also computed; we followed Cohen's (988) suggestion in that we classified effect sizes around 0.20 as small, around 0.50 as moderate, and around 0.80 as large. Statistical significance was set at $P < 0.05$.

2.3 Results

Table 2.2 presents the means, standard deviations and effect sizes of the declarative and procedural knowledge scales of the TACSIS. The effect sizes for the TACSIS subscales *Knowing about ball actions* and *Positioning and deciding* were small (d =0.14 and d = 0.21) i.e., the talented soccer players attending pre-university schools scored higher than their talented counterparts attending pre-vocational schools. The subscales Knowing about others and Acting in changing situations had moderate effect sizes (d = 0.39 and d = 0.41).On the subscale *Knowing about others* the players attending pre-university schools outscored the players attending pre-vocational schools whereas on the subscale *Acting in changing situations* the players attending pre-vocational schools outscored their counterparts attending pre-university schools. The MANCOVA revealed a significant main effect for the differences between pre-vocational and pre-university level on the TACSIS ($F_{1,88}$=3.15, P<0.05). The scores on the individual TACSIS subscales did not reveal any significant differences (P>0.05). The covariate repeating class in school had no influence (P>0.05), while field position was significant (P<0.05) (See Table 2.3).

Table 2.2. Means (SDs) and effect sizes (d) for scores on the TACSIS subscales for the elite youth soccer player per type of education.

	Educational level		
	Pre-vocational *n*=45	Pre-university *n*=48	*d*
Declarative knowledge			
Knowing about ball actions	4.21 (0.71)	4.31 (0.69)	0.14
Knowing about others	3.84 (0.65)	4.09 (0.62)	0.39
Procedural knowledge			
Positioning and deciding	3.75 (0.64)	3.88 (0.59)	0.21
Acting in changing situations	4.21 (0.69)	3.92 (0.73)	0.41

d around 0.20 is small; *d* around 0.50 is moderate; *d* around 0.80 is large (Cohen, 1988)

Table 2.3. Results of MANCOVA for type of education with repeating class in school and field position as covariate

	Wilks' Lambda	F-value	Hypothesis df	Error df	*P*-value
Type of education	0.871	3.147	4	85	0.018
Field position	0.884	2.782	4	85	0.032
Repeating class in school	0.980	0.436	4	85	0.782

2.4 Discussion

Although evidence of a positive association between tactical skills and sport performance and between sport performance and academic achievement has been reported previously, these earlier studies did not compare the tactical skills of elite youth athletes at different educational levels even though tactical skills and education both rely on cognitive skills. The current study is one of the first to directly compare the young players' sport-related cognitive competencies to their academic achievements with the aim to investigate the differences on declarative and procedural tactical knowledge of elite youth soccer players attending different levels of education.

The results of this study suggest that there are differences between elite youth soccer players attending pre-vocational versus those attending pre-university educational levels on the total construct of tactical skills of elite youth soccer players. The results showed that pre-university players outscored the pre-vocational players on the TACSIS subscales *Knowing about ball actions*, *Knowing about others*, and *Positioning and deciding*. On the TACSIS subscale

Acting in changing situations the pre-vocational players outscored the pre-university players. Only the subscales *Knowing about others* and *Acting in changing situations* had moderate effect sizes (0.39; 0.41); the other subscales showed small differences between players of different educational levels.

The subscale *Knowing about others* consists of questions concerning declarative knowledge. Declarative knowledge is taken to denote the factual information of a skill domain (Alexander & Judy, 1988; Anderson, 1982), which, for invasion sports, means the rules and goals of the game. Players attending pre-university schools outscored players attending pre-vocational school on declarative knowledge, this may be explained by the objective of pre-university schools. Pre-university schools prepares teenagers for an academic career with the knowledge being taught focusing on continuing education and general knowledge (Ministerie van OCW, 2008). They learn to gain knowledge and to use this in their future studies. Pre-university students learn to store knowledge pertaining to cognitive domains, and, given that the athletes that attended pre-university schools had higher scores on declarative tactical skills knowledge, the cognitive skills they acquire during their academic studies may help them or are consistent with the skills to develop their declarative knowledge in sport situations.

The TACSIS subscale *Acting in changing situations* consists of questions related to procedural knowledge. The quintessence of procedural knowledge is the ability to correctly interpret a specific situation, to make decisions in a split second, and to subsequently execute the right action (French & Thomas, 1987; McPherson & Thomas, 1989; McPherson, 1994; Thomas & Thomas, 1994). This part of our knowledge system is thus all about 'doing it,' in other words about athletes having to recognize the situation on the field and choosing the appropriate response. It seems that players attending pre-vocational schools have a slight advantage on this scale. The objective of pre-vocational schools is to help teenage children attain general skills and prepare them for their future working lives with a focus on skills required in practically oriented professions (Ministerie van OCW, 2008). Children attending pre-vocational schools learn skills, which they have to apply in other situations. This is in agreement with the content of the questions of the subscale *Acting in changing situations*.

Nevertheless, to develop high levels of tactical skills most likely practice in sport-specific situations is important (Mountakis, 2009). The participants of this study belonged to the top 0.5% of all soccer players in their age group and have accumulated over 10 years of organized soccer training. This confirmed that, regardless of their level of education, all athletes in our sample were experts in their sports, competing at the highest level in their age category. Hence differences within this homogenous group will be small. This is in consistent with researchers who have indicated that there is a positive relationship between practice and expert performance (Baker & Horton, 2004) and with research that found that decision-making has to be learned through practice within the context of the game (Turner & Martinek, 1999).

Even though all the participants of this study were elite players, they still have to move up from youth competitions through adult competition and in the subsequent years it becomes

apparent whether they actually reach the status of professional soccer players or not. About half of them ultimately reach the top (Roescher, Elferink-Gemser, Huijgen & Visscher, in press). Since the pre-vocational players had in general a lower score than the pre-university players on the subscales *Knowing about ball actions*, *Knowing about others* and *Positioning and deciding* but scored higher on the subscale *Acting in changing situations* it is recommended to investigate which players will become professional versus who will stay at the amateur level and whether this is related to their tactical skills and academic achievements.

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